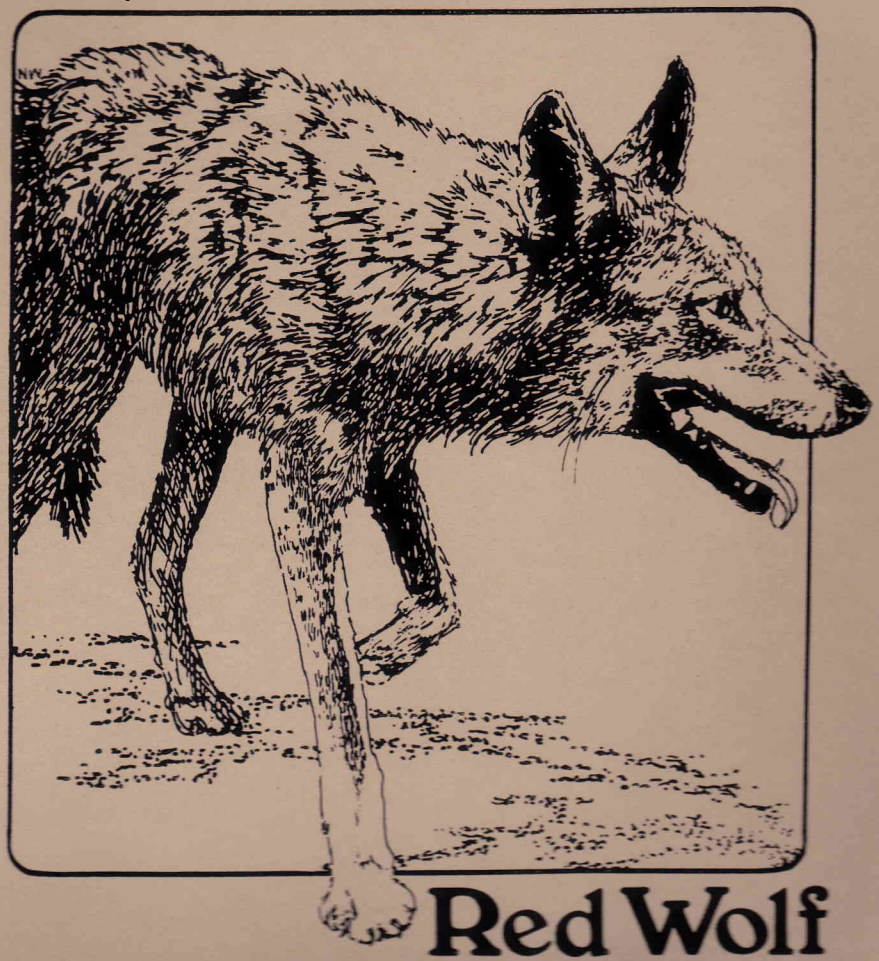
# RECOVERY PLAN



# Red Wolf

# RED WOLF RECOVERY PLAN

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# PART I - INTRODUCTION

The red wolf (*Canis rufus*) is a little-known North American canine that once ranged over the Southeastern United States, from the Atlantic Ocean to central Texas and from the Gulf of Mexico to central Missouri and southern Illinois. It was first described by Bartram (1791) in the 18th century and was believed to have consisted of three subspecies, *Canis rufus floridanus*, *Canis rufus rufus*, and *Canis rufus gregoryi*. The eastern subspecies (*C. r. floridanus*) became extinct early in this century (Young and Goldman, 1944). The western subspecies (*C. r. rufus*), thought by McCarley (1962) to be a hybrid form resulting from breeding the coyote (*C. latrans*) and *Canis rufus gregoryi*, and therefore not a valid taxon, is believed to have recently become extinct in the pure form (Carley, 1975). Recent findings indicate that the only extant subspecies (*C. r. gregoryi*), once occurring from eastern Texas to eastern Mississippi, for all practical purposes is extinct in the wild in the pure form (McCarley and Carley, 1979).

Although the red wolf was once found in numerous habitats throughout the Southeastern United States, its range after 1970 was restricted to less than 900 square miles of extreme southeast Texas and less than 800 square miles of extreme southwest Louisiana. This range can be roughly described as the area south of Interstate Highway 10 in Jefferson and Orange Counties in Texas, and in Cameron and Calcasieu Parishes, Louisiana, west of Calcasieu Lake. By the early 1970s they were found in only limited numbers in the southernmost reaches

of even this area. Hybrids and coyotes were in the majority (McCarley and Carley, 1979).

The primary habitats within this area are coastal prairies and marshes. The prairie extends as a thin band of relatively high ground between the coastal marsh and the extensive forest of east Texas and western Louisiana. Forested lands extend northward from a line drawn roughly from Anahuac, Texas, to the northwest corner of Jefferson County and then eastward into Louisiana along Interstate Highway 10. Wooded areas also extend along bayous that traverse the prairie. Elevations within the area vary from 0 to 25 feet above sea level. Most of the coastal prairie, once characterized by tall bunch grasses and the site of some of the earliest ranches in Texas, is in private ownership and is farmed intensively. The leading agricultural products of the area are cattle, rice, and soybeans. Petroleum production is widespread, and the area is becoming heavily industrialized by the associated petrochemical complex.

The coastal marsh, characterized by salt-tolerant grasses and sedges, starts as a narrow band along the northern edge of East Bay in Chambers County, Texas, and rapidly expands eastward. In general, it stretches from the Gulf of Mexico northward to a line starting at the tip of the peninsula separating Trinity and East Bays in Texas and extends eastward slightly north of and paralleling the Intracoastal Waterway to Calcasieu Lake, Louisiana. Most of Cameron Parish, west of Calcasieu Lake, is coastal marsh. The marsh, much of which is privately owned, is noted for its abundance of alligators, fur bearers

such as nutria, muskrats, and raccoons, and its large flocks of wintering snow geese. Petroleum related activity is widespread. Oil company roads, raised "cow walks," and levees permit ranchers to move herds of cattle into the area for winter grazing. Large areas of the marsh are burned each spring to remove dead vegetation and stimulate new growth. Waterfowl hunting is popular during the winter months (McCarley and Carley, 1979).

The climate is subtropical. A prevailing southeasterly wind maintains high relative humidity. The average annual rainfall is approximately 60 inches, while annual temperatures range from the high teens to 100° F. The area is subject to hurricanes. Thundershowers are common during the summer months, and long rainy periods occur in the winter when cold air masses encounter moist Gulf air. Biting and sucking insects abound most of the year.

The primary habitat requirement for the red wolf in its final range was heavy vegetative cover. Radio telemetry studies and field observations made during the Red Wolf Recovery Program indicated that the heavy cover provided along bayous and in fallow fields constituted the primary resting and denning areas of the species. During active periods, the animals ranged out from these areas into rice fields and pastures. Oil company access roads, dikes, and canal levees provided the primary travel routes through the area. It was not unusual to locate wolf sign far from cover along well-traveled roads (Carley, 1975). Canids of the area are often struck by vehicles when crossing major highways.

Wolves did not appear to be common in the coastal marshes. Although they ventured into the marshes along cattle walkways and oil field roads, the area did not appear suitable for habitation throughout the year. Wolves were more evident in the marshes during the winter when mosquito populations and vegetative production were reduced.

Specific information regarding the life history of the species is sketchy since no significant studies were made when viable wild populations still existed. The following generalities have been determined through literature surveys, personal communications, and the experiences of Red Wolf Recovery Program biologists.

The social structure of the red wolf is probably not as regimented as the pack system reported for gray wolves by Burkholder (1959), Mech (1966 and 1970), and others, or as unfettered as that suspected for coyotes (Knowlton, 1972; Riley and McBride, 1972). T. E. "Doc" Harris (personal communication) stated that the red wolves he observed in the 1950s exhibited a strong family bond. Howling surveys and radio telemetry studies conducted by Red Wolf Recovery Program personnel often sighted lone wolves; however, groups of two or three were more common. The largest groups encountered consisted of seven animals. Groups tended to be larger in the fall when the current year's offspring were traveling with their parents.

Reports of "strong" pair bonding in gray wolves are numerous (Mech, 1970; Fox, 1975). The relationship of mated red wolves in the wild is not known.

Translocated red wolves, thought to be naturally mated pairs due to the circumstances of their capture, have stayed together (Carley, 1981). In captivity, paired red wolves appear to be fond of each other, often play together, and greet each other through typical canine mouthing and nuzzling. Wild-caught adult wolves paired only two to three months prior to the breeding season have produced pups in captivity. A female captured with her suspected natural mate in October was placed in a pen with another pair of animals in January, her mate having died in December. The other pair of animals had been together since November; however, the male bred the new member of the trio, producing three pups. There was no indication that both females had been bred. All three adults tended the pups; no aggressive actions were observed between the two females. In another instance, a pair of wolves that had been together for several years, producing one litter of pups, were separated and placed with different mates. Although only 40 feet apart and able to view his former mate, the male bred with his new mate. There was no indication that his original mate was bred by her new companion.

As in the coyote, gray wolf, and dog, the gestation period for red wolves is 60 to 63 days. Pups are born in April or May. Thus far, litter sizes in captivity have ranged from two to eight pups with an average of 4.6 per litter. Nowak (1972) reports accounts of as many as 12 pups.

As reported by Nowak (1972), earlier accounts state that red wolves have been known to establish dens in hollow tree trunks, stream banks, former dens of other animals, and in sand knolls in coastal areas. Riley and McBride

(1972) report denning occurring in drain pipes, culverts, and the banks of irrigation ditches. Recovery program biologists observed den excavations in sand knolls on the coastal prairie; however, no evidence of pups in the dens was ever found. A den located in a brush pile created during the construction of a golf course was used to rear a litter of hybrid pups. Due to poor drainage, a high water table, and commonly heavy showers along the coast, some of the dens were flooded. As evidenced by Riley and McBride (1972), in the flood-prone heavily vegetated habitat, most pups were probably born in grass "nests" located in areas of heavy cover. A diverse terrain would provide additional den sites and better protect the young.

Red wolves in captivity have excavated their own dens, used manmade dens, or simply had their pups in shallow depressions, the latter case being common even when manmade dens were provided. When the keepers became concerned about the welfare of the captive-born pups during heavy rains and moved them to the dens provided, the female often returned the pups to their shallow nest. No captive-born pups are known to have died as a result of exposure to weather; however, without the protection of a den, several pups were lost to avian predators.

The red wolf is an opportunistic predator, and as such, tends to eat prey species that present the greatest opportunity for capture. As reported by Stutzenbaker (1968), Russell and Shaw (1971), Riley and McBride (1972), and Shaw (1975), the common prey species utilized by wild canids in southeast Texas and southwest Louisiana are nutria, swamp rabbit, cottontail rabbit, rice rat,

cotton rat, muskrat, and raccoon. Historically, red wolves are reported to have killed razorback hogs (Young, 1946) and deer (Young and Goldman, 1944). In addition, scats examined from wolves translocated to Bulls Island of the Cape Romain National Wildlife Refuge in South Carolina contained fox squirrels, American coot, and parts of unidentified birds and small mammals. Red wolves, like coyotes and gray wolves, are also carrion feeders.

Red wolves will prey on domestic livestock; however, such predation appears to be based on opportunity. Young calves less than six to eight weeks of age are susceptible to predation if not attended by a cow. Small barnyard animals, if allowed to run free, are also subject to predation. Recovery program biologists observed red wolf predation on young calves, incapacitated cows, pigs, and barnyard fowl. The lack of a pack hunting structure and an abundance of small prey preclude the possibility of red wolves killing grown healthy cattle. Carrion feeding may lead some observers to conclude that livestock predation is a serious problem. Riley and McBride (1972) reported that ranchers in the range of the red wolf disagreed as to the seriousness of the wolf as a killer of cattle, a disagreement that never existed with the gray wolf. They interpreted the fact that there was disagreement among the ranchers as meaning that red wolves are not a serious predator of cattle.

Shaw (1975) reported an average home range of 17 square miles for two female and five male canids involved in a telemetry study in red wolf range in 1972. Riley and McBride (1972), by systematic tracking of three adult canids for one year, estimated the home range of a red wolf to be 25 to 50 square

miles. In a telemetry study conducted in 1974, recovery program biologists concluded that male red wolves ranged over an area of about 45 square miles, while the range of females averaged somewhat smaller (25 to 30 square miles) (Carley, 1975). Sub-adult home ranges appeared larger than those of adult animals. The home range of a red wolf is undoubtedly dependent upon the habitat in which it resides, the terrain, and the availability of prey. In southeast Texas and southwest Louisiana, it was evident that the wolves often traversed areas larger than required for the purposes of obtaining food. The general pattern appeared to be one of remaining in a relatively small area for a week to ten days, with occasional overnight round-trip explorations to other areas. Then the animal moved several miles to a new area where it remained for another week to ten days. Such movements may have been the result of depleted food supplies in previously hunted areas. After several such relocations, the animal usually returned to the original area occupied. A pattern similar to the above was also observed in translocated red wolves (Carley, 1981).

The life span of the red wolf in coastal southeast Texas and southwest Louisiana was short. The estimated life span of the majority of the animals captured was less than 4 years of age. Occasional animals were found that appeared to be 7 to 8 years old. In captivity, with good care, the life span of red wolves should be about 14 years, similar to that of captive gray wolves or dog breeds of the same general size.

The initial decline of the species is believed to have been caused by increases in human population, changes in land use during the early 1900s, and

predator control activities. As the species declined, coyotes rapidly moved into western portions of the red wolf's range. In areas where some red wolves survived, reproductive isolation between the red wolf and coyote broke down and led to hybridization between the two species. This in turn led to the establishment of a hybrid which invaded the final range of the red wolf in southeast Texas and southwest Louisiana.

The red wolf was listed as a federally endangered species on March 11, 1967, and a limited Red Wolf Recovery Program was established that same year. Following passage of the Endangered Species Act of 1973, the red wolf was selected for priority treatment. At that time an expanded program to save the species was initiated by the U.S. Fish and Wildlife Service in cooperation with the Louisiana Wildlife and Fisheries Commission and the Texas Parks and Wildlife Department. Early program findings confirmed that the red wolf was confronted by loss of habitat, loss of young to parasites, persecution by man, and an irreversible dilution of the gene pool by invading coyotes (Carley, 1975). By late 1975, it was concluded that it was no longer feasible to preserve the red wolf gene pool in its limited range in Texas and Louisiana. Once this decision had been made, the primary objectives of the program were: (1) locate and capture as many red wolves as possible in an attempt to preserve the species in captivity and (2) explore the feasibility of reestablishing red wolf populations in areas of the species' historic range. It was recognized by all concerned that the active removal of specimens from Texas and Louisiana would hasten the demise of the species in the wild. However, since extinction

in the two states appeared to be inevitable, removal of the few remaining wolves was determined to be the only practical means of preservation.

In November 1973, as part of the overall Red Wolf Recovery Program, a captive breeding project was established through the Metropolitan Park Board of Tacoma at the Point Defiance Zoological Garden in Tacoma, Washington. The objectives of the program were to: (1) certify the genetic purity of wild-caught wolves, (2) increase the number of genetically pure red wolves in captivity, and (3) maintain a continuing red wolf gene pool for reestablishment of the species in the wild and/or distribution to selected zoological gardens.

Because of hybridization and the resultant occurrence of specimens ranging in appearance from coyote-like to wolf-like, the Red Wolf Recovery Program has had to be quite selective in choosing specimens that represent the red wolf subspecies, C. r. gregoryi. Minimum taxonomic standards were established for the selection of adult male and female wild red wolves used for captive breeding. These standards included the following criteria:

| | Male | Female |
|---|---|---|
| Skull length | 215 mm | 210 mm |
| Zygomatic breadth | 110 mm | 110 mm |
| Weight | 50 lbs (22.5 kg.) | 42 lbs (19 kg.) |
| Total length | 53 in (1,346 mm) | 51 in (1,295 mm) |
| Hind foot length | 9 in (229 mm) | 8 3/4 in (222 mm) |
| Ear length | 4 3/4 in (120.6 mm) | 4 1/2 in (114.3 mm) |
| Shoulder height | 27 in (685.8 mm) | 26.5 in (673.1 mm) |
| Brain/Skull ratio | 23 | 23.5 |

Additional techniques utilized in the captive breeding program included skull X ray, electrophoretic and vocalization analysis. Confirmation of the identification of individual specimens could only be made by examination of offspring. Offspring born to the program were maintained for one year and examined quarterly for the purpose of confirming the initial identification of their parents. A number of litters have been produced since 1977 and some of the early litters were determined to be probable hybrids. The suspected hybrids and their parents were removed from the program. Personnel of the Red Wolf Captive Breeding Program are now confident that animals being produced and maintained represent the true red wolf.

In the fall of 1984 the program breeding stock was accepted under the Species Survival Plan (SSP) captive management program developed by the American Association of Zoological Parks and Aquariums (AAZPA). The SSP Propagation Committee formed of a representative from the U.S. Fish and Wildlife Service and each of the participating zoos will manage the breeding of the species in captivity and ensure its genetic integrity.

As of June 1984 there were 7 wild-caught wolves and 43 captive-born wolves in the captive breeding program. The majority of these animals are located at the central breeding facility managed by the Point Defiance Zoo at Tacoma, Washington, under contract with the U.S. Fish and Wildlife Service. The remaining animals are located at the Audubon Zoo in New Orleans; the Victoria, Texas, Zoo; the Alexandria, Louisiana, Zoo; the Animal Park, Inc. at Gulf

Breeze, Florida; and the Wild Canid Survival and Research Center in St. Louis, Missouri.

Experimental reestablishment of mated pairs of adult wild-caught red wolves has been tested on Bulls Island of the Cape Romain National Wildlife Refuge near Charleston, South Carolina (Carley, 1979; Carley, 1981). Results indicate it is possible to reestablish adult wild-caught red wolves in selected habitats in the wild. Observations on the opportunistic nature of wild canine species and their learning abilities, as well as limited experiments with wild-caught but captive-reared pups in Texas, also indicate that the establishment of captive-reared specimens in the wild is feasible.

An effort to actually establish a population of red wolves was attempted during the period from 1982 to 1984 on the Tennessee Valley Authority's Land Between the Lakes. This particular site, located in southwestern Kentucky and northwestern Tennessee, contains about 170,000 acres of land that is owned by the Federal government. Carley and Mechler (1983) developed a detailed proposal that was carefully reviewed and coordinated with respective state wildlife agencies. Public hearings were held in Kentucky and Tennessee during the months of November and December 1983.

The wildlife agencies of both Kentucky and Tennessee eventually rejected the reintroduction proposal "as submitted." An analysis of those factors that led to the rejection will obviously be weighed in all future reintroduction strategies for this species. One of the key factors was the failure to

adequately inform the public of the details of the proposal, and of the plight and nature of the red wolf. Another, and perhaps even more significant factor, was the concern that if the wolves were released, political and/or legal pressures might void agency agreements on the conduct of the project itself. This concern was generated by comments from a national environmental organization that opposed the project primarily because of the untested "experimental" classification of released animals. Their fear was that this designation might not afford the wolves and their offspring adequate protection.

Much was learned from the experience in Kentucky and Tennessee. Among other things, it is apparent that future introduction attempts must emphasize efforts to inform the public of the true nature of the wolves. In addition, attempts must emphasize aiding concerned environmentalists in better understanding administrative and biological actions that must be utilized to accomplish the successful reestablishment of a listed species.

This recovery plan was prepared with the consideration that, for all practical purposes, genetically pure red wolves were extinct in the wild by the autumn of 1980. Complete recovery of the species can only be accomplished by maintaining a captive population and by reestablishing self-sustaining wild populations that will once again be subject to the laws of natural selection and the social structure established by such populations. Only in this way can the red wolf reestablish itself as a representative member of our native

mammalian fauna and become better understood through observations of its behavior in natural ecosystems.

# PART II - RECOVERY

## A. Recovery Objective

The ultimate goal of the recovery plan is to return the red wolf to non-endangered status.

Full recovery of the species, that is to the point where it could be removed from the Federal list, will require the establishment of at least three viable, self-sustaining populations widely distributed across the species' historic range. A viable, self-sustaining population is defined here as a population which can be expected to persist in perpetuity. The successful establishment of a minimum of three such populations on lands considered to be "secure" (National Forest lands, National Wildlife Refuges, etc.) would assure the species' place in our native fauna, even if on a limited scale.

Realizing the extensive demands required for this species, it was determined that three self-sustaining populations would be a minimum before delisting of the species could be considered. An unexpected catastrophic event could decimate one population, yet the fate of the species in the wild would still be assured. These widely disjunct populations would also provide the long-term basis for developing heterozygosity that would be used for "rebuilding" the species' genetic variability. Lacking additional guidelines, the minimum of three populations appears reasonable for this species.

A viable, wild, self-sustaining red wolf population (35 to 50 animals) will require a minimum land area of about 225 square miles (144,000 acres or 582.75 $km^2$). The configuration of the area, drainages passing through it, distribution of prey species, and likely travel routes that the animals establish will determine the maximum population that can be sustained on a given area. Areas of smaller size can also be considered since natural barriers and adjacent land use patterns may enhance their suitability. Areas meeting the minimum size requirements will eventually require the periodic removal of excess animals to reduce interspecific competition and to provide stocking into other areas for enhancing genetic variability.

A possible "acclimation" program would involve the use of one or more coastal barrier islands. These relatively small, isolated islands, components of existing national wildlife refuges, could be utilized for the release of a small number of captive-reared, radio-telemetered wolves so that they could become better acclimated to the rigors and demands of a wild environment. These animals could later be recaptured and utilized in major mainland reintroduction efforts.

Some potential introduction sites will have resident coyote populations. The presence of coyotes should not automatically exclude an otherwise suitable site. It is thought that with a properly structured family group the problem of hybridization can be eliminated, but admittedly this is conjecture, and will remain conjecture unless or until tested in reestablishment efforts.

Experience from the Land Between the Lakes proposal indicates that the biggest problem facing a successful red wolf introduction is the name "wolf." Preconceived notions and fears concerning wolves can only be altered by an actual controlled demonstration that red wolves can be introduced into an area without the livelihood and habits of adjacent human populations being impacted by the animals. Therefore, it is imperative that the first introduction be made without any major alteration in the ongoing or dedicated uses of an area. We are convinced that the species can make it on its own if given an opportunity. Hopefully this approach will allow introductions onto other lands within the species' historic range.

B. Step-down Outline

Recovery activities have been divided into two principal objectives: (1) reestablishment of self-sustaining wild populations within the species' historic range and (2) establishment and maintenance of captive breeding stock.

The latter objective has two subobjectives; the primary one being production of pure red wolf stock for use in reestablishment efforts, and a secondary one of providing pure red wolves for distribution to zoos and other facilities throughout the nation. These wolves would serve as a reserve gene pool to assure genetic survival of the species in the event initial reestablishment efforts are unsuccessful.

Please note that in the following outline tasks within the same level do not necessarily reflect chronological sequence.

1. Reestablish self-sustaining wild populations of red wolves within their historic range.

1.1 Implement reestablishment proposals.

1.11 Prepare reestablishment proposals.

1.12 Establish requirements of suitable sites.

1.13 Evaluate and select potential release sites and reintroduce red wolves.

1.131 Estimate Canis' composition and density.

1.132 Determine feasibility of removing Canis.

1.133 Determine extent of potential problems with parasites and diseases.

1.134 Determine public relations aspect of reestablishment.

1.135 Determine compatibility of species to ecosystem.

1.136 Reintroduce red wolves.

1.2 Evaluate other release sites.

1.3 Reintroduce red wolves at other locations as appropriate.

2. Propagate pure red wolves suitable for reestablishment of the species in the wild.

2.1 Establish and maintain captive breeding facilities.

2.2 Maintain integrity of broodstock.

2.3 Certify red wolves and select breeding pairs.

2.4 Help assure proper implementation of breeding program through American Association of Zoological Parks and Aquariums (AAZPA).

2.5 Maintain captive gene pool in government supported facilities until survival of the species is assured in the wild.

C. Narrative

Project Objective 1: Reestablish self-sustaining wild populations of red wolves within their historic range.

1.1 Implement reestablishment proposal(s). Carry out activities identified in the reestablishment proposal, including post-release monitoring of the wolves and the ecosystem. If necessary modify management techniques or terminate the program by removing the animals, based on evaluation of wolf movements, reproductive success, hybridization factors, public relations, adaptation to the ecosystem, or impacts to the ecosystem.

1.11 Prepare reestablishment proposals. These documents should take the form of a "Memorandum of Understanding" between the Fish and Wildlife Service and the landholding agency, and should outline on a site specific basis all of the requirements for the reestablishment program and each agency's authority, capability, and responsibility to carry out these requirements. Presumably, it would address such topics as the preparation of an environmental impact statement (if needed), an information/education program and/or public meetings or hearings, regulatory changes (if needed), Canis control, pre-release training or

conditioning of the animals and post-release monitoring, evaluation of the program, management, etc.

Following completion and concurrence by the Service and the landholding agency, it should be submitted to the state game and/or regulatory agency for their review and comments or suggestions prior to implementation of any facet of the proposal.

1.12 Establish requirements of suitable sites. Based on existing knowledge of home range, prey species, hybridization, etc., establish criteria for reestablishment requirements.

1.13 Evaluate and select potential release sites. A minimum of three sites most closely meeting the established criteria should be selected for initial reestablishment efforts, which should be considered experimental.

1.131 Estimate resident Canis' composition and density. Determine, insofar as possible from available information, the estimated numbers and species of resident canids and anticipated conflicts with introduced red wolves.

that initial reestablishment efforts for this controversial predator will be limited to large public landholdings where management of the species and its ecosystem can best be effected. The number of areas in the species' former range that fit this criteria are limited. Other factors such as management objectives of the landholding agency, the presence or abundance of other canids, the availability of manpower and funding, and similar obstacles further reduce the number of potential sites. Initial releases should be considered experimental. Based on the results of these initial releases, we may discover that the criteria used in site selection (size, isolation, abundance of other canids, type and abundance of prey species, etc.) may be reevaluated, thereby increasing the potential of other sites previously considered unsuitable. At least three initial release sites are considered necessary in order to include as many variables as possible, as well as provide a measure of "insurance" against the loss of one of the populations.

If results of the initial reestablishment efforts lead to the conclusion that less stringent criteria can be used for release sites, then a subsequent search for additional sites should be initiated, possibly through the use of specific individuals within each of the states of the historic range. This could lead to the inclusion of private conservation groups, individuals, or

corporations with significant landholdings as well as state land managing agencies.

Project Objective 2: Propagate pure red wolves suitable for the reestablishment of the species in the wild.

2.1 Establish and maintain captive breeding facilities. Incorporate wild-caught canids into captive breeding facilities with the objective of screening animals through comparison with established criteria and selectively breeding pairs to ensure genetic variability.

2.2 Maintain integrity of broodstock. Monitor alleged red wolves in other facilities and, through the participation and cooperation of the American Association of Zoological Parks and Aquariums, maintain the integrity of the red wolf broodstock.

2.3 Select breeding pairs from available stock and certify offspring.

2.4 Help assure proper implementation of breeding program through American Association of Zoological Parks and Aquariums (AAZPA). Maintain cooperation of AAZPA to ensure that the stud book is accurately maintained and establish criteria to dispose of wolves excess to the reestablishment effort. Facilitate selection of

red wolf recipients and ensure that participating facilities adhere strictly to the regulations.

2.5 Maintain captive gene pool in government supported facilities until survival of the species is assured in the wild. The total number of wolves maintained in a captive breeding program will be limited by the number and nature of the facilities capable and willing to support them. Idealistically, at least 50 breeding pairs of wolves would be desirable, but maintenance of this number would probably require the continued operation of a government supported facility somewhat similar to the one presently being operated at Tacoma. At the present time six zoos and one privately operated facility have expressed interest in obtaining red wolves. Presumably, additional zoos would enter into the program when red wolf stock becomes available, but their combined capacity would still probably be less than the 50-pair objective. The need for this number of animals is subject to revision pending results of other facets of the recovery action and, with successful reestablishment in the wild, could be reduced considerably and the use of government supported facilities phased out.

The actions outlined in this plan of necessity have to be generalized in nature. Prior to any actual reestablishment activity it is recognized that a much more specific document outlining procedures tailored to conditions of

the particular site will have to be prepared. This document will have to address such variables as public relations, canid control techniques, monitoring, conditioning or "training" of animals prior to release, agency responsibilities, number of animals, location of release, time (season) of release, etc. This document is identified in the step-down outline as the reestablishment proposal and presumably will require the concurrence of all parties involved.

Agencies presently recognized as serving in the recovery of the species include, but may not be limited to, the U.S. Fish and Wildlife Service (USFWS); the Point Defiance Zoological Gardens of the Metropolitan Park District of Tacoma, Washington (PDZG); the American Association of Zoological Parks and Aquariums (AAZPA); zoological parks and environmental groups across the nation; government landholding agencies in the Southeastern United States; and state game departments and/or regulatory agencies in states where reestablishment sites are selected.

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# KEY TO IMPLEMENTATION SCHEDULE COLUMNS 1 AND 4

General Category (Column 1):

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depradation control
6. Disease control
7. Other management

Priority (Column 4):

1 - Those actions absolutely necessary to prevent extinction of the species.

2 - Those actions necessary to maintain the species' current population status.

3 - All other actions necessary to provide for full recovery of the species.

Part III Implementation Schedule

| General Category | Plan Task | Task Number | Priority | Task Duration | Responsible Agency | | | Estimated Fiscal Year Costs | | | Comments/Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FWS | | | | | | |
| | | | | | Region | Program | Other | FY 1 | FY 2 | FY 3 | |
| 04 | Prepare reestablishment proposals. | 1.11 | 1 | Continuing | 4 | SE | State and Federal agencies | | | | One site under review; LBL proposal completed. |
| I13 | Establish requirements for release site. | 1.12 | 1 | Continuing | 4 | SE | | | | | Initial requirements established. |
| I13 | Evaluate and select release sites. | 1.13 | 1 | Completed | 4 | SE | | | | | Initial evaluation under review for potential site in North Carolina. |
| I13 | Estimate Canis composition. | 1.131 | 1 | Continuing | 4 | SE | State and Federal agencies | | | | |
| I13 | Determine feasibility of Canis removal. | 1.132 | 1 | Continuing | 4 | SE | State and Federal agencies | | | | |
| I13 | Evaluate parasite/disease problems. | 1.133 | 1 | Continuing | 4 | SE | | | | | |
| 01 | Evaluate public relations aspect of reestablishment. | 1.134 | 1 | Continuing | 4 | SE,PAO | State and Federal agencies | | | | |
| I13 | Determine compatibility of species to ecosystem. | 1.135 | 1 | Continuing | 4 | SE | State and Federal agencies | | | | |
| I13 | Reintroduce red wolves. | 1.136 | 1 | Continuing | 4 | SE,WR, PAO | State and Federal agencies | 70,000 | 60,000 | 40,000 | |
| I13 | Evaluate other release sites. | 1.2 | 1 | Continuing | 4 | SE | State and Federal agencies | | 6,000 | 6,000 | |
| M2 | Reintroduce red wolves at other locations. | 1.3 | 1 | Continuing | 4 | SE | State and Federal agencies | | | | |
| M1 | Establish and maintain captive breeding facilities. | 2.1 | 1 | Completed | 2 | SE | | | | | |

Part III Implementation Schedule

| General Category | Plan Task | Task Number | Priority | Task Duration | Responsible Agency | | | Estimated Fiscal Year Costs | | | Comments/Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FWS | | | | | | |
| | | | | | Region | Program | Other | FY 1 | FY 2 | FY 3 | |
| M1 | Maintain broodstock integrity. | 2.2 | 1 | Continuing | 2 | SE | AAZPA* | | | | Costs are included in task 2.5. |
| M1 | Breeding pair selection; certification of offspring. | 2.3 | 1 | Continuing | 2 | SE | | | | | Costs are included in task 2.5. |
| M1 | Breeding records; disposition of excess wolves. | 2.4 | 1 | Continuing | 2 | SE | AAZPA | 1,000 | 1,000 | 1,000 | |
| M1 | Maintain captive breeding program. | 2.5 | 1 | Ongoing | 2 | SE | PDZ** | 30,000 | 32,000 | 32,000 | |

NOTE: Abbreviations -
* American Association of Zoological Parks and Aquariums
** Point Defiance Zoo

# PART IV - APPENDIX

## Recovery Team Responses to Selected Comments from Reviewers

Several reviewers recommended that studies and monitoring be continued within the southeastern Texas-southwestern Louisiana range, either on a continuous or periodic basis. It was pointed out that this area still contains a number of animals that are at least 50 percent red wolf and that such studies could be invaluable in documenting the influence of coyote infusion or that the animals themselves might be used in efforts to breed back the species. There was concern that the techniques used at present to certify the breeding stock could be eliminating some of the gene characteristics of the red wolf.

The recent (January 1981) killing of a wild canid by a hunter in St. Martin Parish, Louisiana, brings out their point. The hunter skinned the animal on the spot and left the carcass. He attempted to sell the skin to a fur dealer, who tentatively identified it as being from a red wolf. The skull was retrieved and examined and its measurements fell within the range of Canis rufus, raising the possibility of a remnant population in the Atchafalaya Basin. It should be recognized, however, that the recovery of a single skull that falls within these parameters does not necessarily indicate the presence of a remnant population.

One reviewer suggested we should consider the use of embryo transplants as a possibility. The technique would utilize captive wild-caught coyotes or

hybrids as surrogate mothers, surgically fixed to prevent later pregnancy. The methodology has been utilized by the cattle industry to upgrade livestock, but there was no indication of its use in canids.

The purpose of using embryo transplants was to provide a "wild" mother to educate her "offspring," as opposed to an actual parent that had become accustomed to captivity. Other reviewers expressed similar concerns about the ability of captive animals to adapt to the wild and suggested the need for behavioral studies and acclimation prior to release. This embryo-transplant technique will be monitored and considered in reintroduction attempts.

We recognize that there may be remnant red wolf populations remaining in the wild and that if so it would be extremely valuable to know about them, but we also feel that there has to be a point of diminishing returns for the potential of locating them and that this point has probably already been reached. This would not preclude subsequent investigations into locations where there might be tangible reasons to make intensive searches, as possible in the case of the recent Louisiana incident, but only in such cases.

Without infinite resources the captive breeding program has to concentrate its efforts on the animals most closely resembling the parameters established for the species. The use of breeding stock with only 50 percent red wolf genes could only be accomplished at the cost of eliminating some of those animals presently in the captive breeding program. Considerable time, money, and effort has been expended to eliminate those individuals that do not breed up to

the established parameters and to include additional recognized hybrids would be a step backwards.

The team feels that the red wolf is an opportunistic predator and that it should have no difficulties in adapting to living in the wild following an adequately designed and carried out acclimation program. This appeared to be the case with the pair released on Bulls Island, and we have no reason to suspect that it should be any different at any other release site with an adequate prey base.

## ACKNOWLEDGMENT

On behalf of the Red Wolf Recovery Team, I would like to take this opportunity to express the Team's appreciation to Curtis Carley for his assistance in the preparation of the Recovery Plan.

Much of the material contained in the Introduction section of the Plan was plagiarized from a publication authored by Mr. Carley and titled Status Summary: The Red Wolf (Canis rufus), U.S. Fish and Wildlife Service Endangered Species Report 7.

David W. Peterson

Team Leader

Part III Implementation Schedule

| General Category | Plan Task | Task Number | Priority | Task Duration | Responsible Agency | | | Estimated Fiscal Year Costs | | | Comments/Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | FWS | | | | | | |
| | | | | | Region | Program | Other | FY 1 | FY 2 | FY 3 | |
| M1 | Maintain broodstock integrity. | 2.2 | 1 | Continuing | 2 | SE | AAZPA* | | | | Costs are included in task 2.5. |
| M1 | Breeding pair selection; certification of offspring. | 2.3 | 1 | Continuing | 2 | SE | | | | | Costs are included in task 2.5. |
| M1 | Breeding records; disposition of excess wolves. | 2.4 | 1 | Continuing | 2 | SE | AAZPA | 1,000 | 1,000 | 1,000 | |
| M1 | Maintain captive breeding program. | 2.5 | 1 | Ongoing | 2 | SE | PDZ** | 30,000 | 32,000 | 32,000 | |

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